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EDITORIAL NOTES

IS IT SUCCEEDING?

INTERESTING reports are filtering in of the various ways in which gas undertakings throughout the country are tackling the fuel economy campaign, so far as the domestic market is concerned, and undoubtedly the Gas Industry is in it to a man. Criticism of the target scheme on points of detail, and the description of battle order No. 1 as being more suited to children's hour than for issue to gas executives, are beside the point so long as each gas undertaking works with enthusiasm in whatever way seems best suited to local circumstances. It must be remembered that it is the mentality of the public which has to be studied in the official propaganda, and if their enthusiasm can be stimulated to any degree by the issue of "battle orders" to gas and electricity executives, then the task of the latter will be by so much lightened.

Is the economy campaign succeeding, or is it not? As far as gas is concerned, this is a very difficult question to answer. Purely residential districts can no doubt already supply useful information from their station meters, but purely residential, unmixed with any industrial or commercial usage, is a comparative rarity and, moreover, usually concerns the class of domestic consumer who is known to be doing his utmost to save. And this may not invariably be from purely patriotic motives; he is the consumer who is financially hardest hit by the war. From all reports it is certainly the slots which have been mainly responsible for domestic increases leading up to the position where the alarm had to be sounded really seriously, though it struck us as a sad commentary on democratic methods to find, when looking at our volumes of over a year ago, that even then the *real* need for *immediate* fuel economy was being stressed by the Government. Where station meter readings cannot, therefore, be used to disclose the month to month position, an urgent cry is going forth for statistics from undertakings which practise continuous meter reading ; and we understand that this system has by no means been widely adopted. In any case, by one means or another, a fairly early judgment on the situation must be made. The sands are running out and, while we understand that the desire in high places to avoid rationing is genuine (contrary to the belief fostered by certain sections of the Press) and possibly a small measure of risk may be justified, there can be no all-out gamble on the prospects of a mild winter or on a sudden upward trend in coal output.

While the appeal which meets the eye everywhere is the one addressed to the millions, it is to be hoped that means are being found at the same time to sustain a continuous drive against waste in industrial usage of fuels. While the scope for saving in this direction was at one time reported to be vast, it has all along been a case where the gas engineer's scope was limited unless the industrialist was his staunch ally, and such alliance has had to be sought largely on the patriotic appeal, because so often in these days the profits motive, and with it the cost of fuel, is a secondary consideration. The gas undertaking's representative can certainly give instructions on the efficient adjustment and working of burners and dampers, but he cannot be held responsible for seeing that full heats are not maintained in idle furnaces. We hope that there has been a general development of the Ministry of Fuel scheme for gas "chasers," though on this point we have no recent information.

GAS CHARGES

SO, at the beginning of the fourth year of war, we are hard at it practising salesmanship in reverse, worrying about coal stocks, coal quality, and many another factor vital to our very existence, and filling in forms and returns by the thousand. We have heard the Industry's assiduity in the last-named direction warmly commended, and indeed it requires more than ordinary patience in times of stress to satisfy the official bureaucratic thirst for statistical information when there are so many other tasks to hand of seemingly greater moment.

The question of gas charges is one which at the moment is causing grave concern to a certain number of undertakings. Many have no need and no desire whatever to raise the price. Some, on the other hand, are faced with the greatest difficulty in carrying on in the face of increased coal, labour, and every other charge connected with gas manufacture. We believe it was in the Chancellor's last budget speech, in connexion with the laudable object of avoiding inflation, that coal and gas were mentioned in the same sentence as likely subjects of price control. From this it might well have been assumed that a Government subsidy could be expected, but at least we were justified in anticipating equal treatment for the two industries. Yet what is the position to-day? Not only district, but even national, increases have been permitted in the case of coal, which *ipso facto* raise the cost of gas manufacture, yet the individual gas undertaking which may be faced with the crying need to increase its price in order to make ends meet must needs still submit to the procedure of an individual enquiry into its special case, and some applications for increases have, we believe, been refused.

While we feel justified in calling attention to what some undertakings cannot help regarding as harsh treatment, we have no hesitation in repeating that the attitude of the Industry as a whole is a determination to continue to pull its full weight in the national effort, and to avoid at almost any cost embarrassing the Government, and consequently the nation. It is grateful if and when any consideration can be spared for its special difficulties, but we do maintain that the efforts hitherto of all those concerned in this great public utility service are deserving of every possible acknowledgment.

DECLARED CALORIFIC VALUE

ALL the latest re-declarations of calorific value which have come to our knowledge have been in a downward direction, and this is not in the least surprising. Drops of 50 B.Th.U. —substantial drops—are not uncommon and are indicative of present tendency. The crux of this trend is the inadequate amount of coal available, inadequate in both quantity and quality, and the more easily understandable reduction in the supply of imported gas oil for carburetting. To what extent the trend is to be regarded only as a wartime expedient we do not know, but it obviously operates to offset benzole extraction, to cope with the poor quality and inadequate quantity of coal now obtainable, and to satisfy the need to conserve oil for carburetted water gas plant. The position of coal supply *vis-à-vis* the production of gas, coke, benzole, and tar becomes no less complex. Benzole is, of course, needed, oil usage has to be

cut, coke output has to be maintained as far as possible, the demand for gas to munition factories and to the homes of the community has to be met. The problem is one of conflicting elements. The Mines Department wants all the coke it can get, the Ministry of Supply needs maximum benzole extraction, with, of course, coal as its source. The Petroleum Board has definite views about oil supply. It is impossible, without adequate raw material, coal, for the Gas Industry to satisfy these different requirements. The Industry is out to do all it can, but of necessity its present operational plan is an unfortunate compromise. Some little time ago we were asked what we thought about compulsory reduction of calorific value, and we replied that in our view compulsion was not needed and that, without it, calorific values would be reduced. Reductions have been and are being made generally; gas undertakings can make more gas, from a given quantity of coal, at the expense of coke, at the expense of benzole, at the expense of tar.

The general method of reducing calorific value is by dilution of coal gas with water gas. It is the most suitable method of obtaining a reduction in coal usage in that it implies no increased proportion of inerts in the gas. The quantities of tar and ammonia and benzole recovered are reduced proportionately to the coal saved. But, with water gas production, the reduction in coke for sale is approximately 1 ton per ton of coal saved. In brief, when calorific value is reduced by blue water gas, coal tonnage carbonized is reduced ; coke production is reduced by the same amount. If the problem is to maintain a given gas output—*i.e.*, thermal output—from 1 ton instead of 2 tons of coal, the Mines Department can say good-bye to the coke output. We have referred to this before, but we doubt whether the point is appreciated as it should be, and we repeat the following simple reasoning which we stated in our issue of July 1 last : Suppose that on carbonization a ton of coal yields 78 therms of gas. From 2 tons we get 156 therms of gas. One ton of coal in an outside water gas plant will make 156 therms of blue gas. Two tons of coal will make by carbonization 156 therms of gas and 1 ton of coke. If the coke is kept off the market, 1 ton of coal will make 156 therms of gas. If the Mines Department cannot give the Gas Industry sufficient coal, the deficiency will at once be translated to the general fuel field—and in like amount.

The Industry's problem, then, is one of expediency, of making the best of unfavourable circumstances. Sound economics do not enter into it. And in this matter of making the best showing under adverse conditions, we would again call attention to the help which we think is to be derived from the contribution on the subject by Mr. E. G. Stewart, of the Gas Light and Coke Company, which we published in the "JOURNAL" of July 1, and which we referred to briefly in these columns at the time. It is because of the flexibility of its manufacturing process that the Industry is able to tackle and cope with the declared calorific value problem, but re-declarations are not solely a question of works procedure, of manipulation of gas-making plant. There is also the aspect of what is likely to happen at the consumer's burner, an aspect heightened in importance by the urgent necessity for maximum economy in the use of every form of thermal energy derived from coal. Within the limits imposed by distribution facilities and the supply of labour (another factor necessarily of first importance) gas undertakings can alter at will the relative makes of gas and coke. We can save coal in appreciable quantities at gas-works, but only at the cost of more or less reduced capacity, and in any case with proportionate reduction in our other fuels, coke, tar, and benzole. And, as Mr. Stewart brought into relief so clearly in his contribution, in regard to gas oil, though it is possible to make severe cuts in consumption, for peak loads and emergency occasions the use of some oil is necessary. The fact is that oil, correctly and wisely used, is one of the most powerful agents we possess to combat the loss of capacity in carbonizing plant, in gasholders, and in labour force. In effecting calorific value changes, however, what we have to aim at is to maintain good service in existing appliances, and this means that we must know their performance over the range of any proposed alterations in declared calorific value of the gas supplied to them. With such knowledge, alteration of air inlets, or even exchange of certain appliance can then be carried out in an organized manner. With appreciable change in calorific value, the quality of the gas mixture produced, in regard to its behaviour in consumers' appliances likely to be noticeably affected, and to ensure the proper efficient use of the gas supplied, it is of the greatest importa that change in declared calorific value should be preceded the necessary arrangements so that the value of the service gas to the consumer is not impaired.

Personal

Mr. J. CASTLE, B.Sc., has been appointed Engineer, Manager, Secretary of the Leyland Gas Company, in succession to Mr. Elliott, who has retired. Mr. Castle took up his duties on Sept. 1.

Obituary

Mr. THOMAS MCEWAN, who for over forty years represented Mes R. & A. Main, Ltd., in Scotland and Northern Ireland, died Aug. 27. Mr. McEwan was very widely known among gas offic in these districts, and his bright and breezy personality endeared h to all with whom he came in contact. His loss will be keenly felt his firm, his colleagues, and his numerous friends in the Industry

Fuel-Saving Exhibitions

Fuel saving exhibitions similar to that at Harrods, Ltd., to wh we referred a fortnight ago, will, if the hopes of the Minister of F and Power are realized, shortly be held in other parts of London also in the Provinces. What at first seemed a local effort has be given a wider significance by the personal visits of Major Lloyd Geor Minister of Fuel and Power, Lord Hyndley, Controller-General of Ministry, Captain C. Waterhouse, Parliamentary Secretary to Board of Trade, Sir John Laurie, Lord Mayor of London, the May of several of the London boroughs, the heads of the fuel industr and of other industries and organizations concerned with fuel savi The Gas Industry was represented by Mr. E. V. Evans, President The Institution of Gas Engineers, Col. F. J. Bywater, Mr. He Woodall, Col. Flowers (London and Counties Coke Associatio Mr. A. J. Mumford (British Gas Light Co.), officials of the B.C.G. and others when Major Lloyd George visited the exhibition on Wedn day of last week and met the civic heads of Kensington, Westminst and other metropolitan boroughs.

After looking round the show, the Minister said he did not want to be thought that the only people concerned in fuel economy were t domestic consumers. We were all in this show together—the domes consumer and the industrial consumer, who must economize, and t producer, who must produce more. The widely advertised "fu target" had been criticized as being beyond the mathematical intel gence of the average consumer, but the necessary calculations we much simpler than many of the other problems the housewife had wrestle with to-day. A class of eight-year-old children in an eleme tary school had been given the task of calculating the "target" figu for their respective homes, and every one of the answers the headmast had forwarded to him were correct. Why a "target" at all ? he aske Because it was useless to talk to the consumer in vague terms of savi so many million tons of fuel a year, and it was only by converting t problem into a "target" for the individual that the extent of the need economy could be understood. Thanking those who had made t exhibition so interesting and instructive, Major Lloyd George said wanted to see similar shows in other parts of the country. He w glad to meet the civic heads of so many of the London borough and he hoped that in conjunction with the industries concerned th would see their way to organizing such exhibitions throughout t metropolis, for he was certain the ordinary person understood f more when the facts were presented so convincingly. The show would entail a lot of work and trouble, but he promised that if ther was anything he could do personally, or any assistance his Ministr could render, he would be very pleased to co-operate.

Severn Valley Gas Corporation, Ltd., has declared an interi dividend on the Ordinary Stock of 2¾% actual, less tax, on accou of the year ending March 31, 1943, payable on Oct. 1 (same).

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

THE GAS INDUSTRY OF THE FUTURE.—5.

HOW THE ELECTRICITY INDUSTRY IS ORGANIZED

The Gas Industry has a great future, but it is generally agreed that it must face radical changes; that it must form opinion within its ranks; and that it must work out its own salvation—or accept the consequences of neglect. To help the Industry to decide which way it wants to go the "JOURNAL" has studied the experiences of other public utility services which have been confronted with similar problems in recent years. The following is the fifth of a series of articles in which an effort is made impartially to review some of the principal schemes of rationalization in the other industries, with their possible lessons for the Gas Industry. The series covers water supply, passenger transport, the main line railways, port and dock authorities, broadcasting, and the electricity industry.

AMONG the public utilities whose experiences in regionalization have been examined in this series, the electricity industry is perhaps the first to which the Gas Industry will look for a general plan. Twenty-five years ago the comparatively new electricity industry was split up into a vast number of unco-ordinated municipal and company-owned undertakings, mostly operating, except in big towns, on a small scale, without standardization in dealing with technical problems, lacking capital facilities, and incapable of large-scale reorganization. Briefly the position in the electricity industry to-day is that the Electricity Commissioners promote, supervise, and regulate the supply of electricity; the Central Electricity Board owns the "Grid," controls all but the least important generating stations, and supplies electricity in bulk to authorized undertakings for distribution. A large measure of standardization has been achieved, and prior to the war some measure of amalgamation was proceeding and was reducing the number of small individual distributing authorities, and facilitating better management throughout.

Functions of the Commissioners

The Electricity Supply Act, 1919, was the first big step towards the rationalization of the industry. It was under that Act that the Electricity Commissioners were appointed to exercise various judicial powers in relation to the supply of electricity, to determine electricity districts and approve or formulate schemes of re-organization, to control extensions of plant, and transmission lines and new stations, and to sanction electricity expenditure by local authorities. The Commissioners, who must not exceed five in number, were under the Act appointed by and responsible to the Minister of Transport (whose electricity functions were transferred to the Board of Trade in 1941, and more recently to the newly created Minister of Fuel and Power). In the case of two of them, the term of office may be fixed by the Minister ; the others hold office during His Majesty's pleasure. Two (originally three) have to be whole time members; three have to be selected for practical, commercial, and scientific knowledge and wide experience, including that of electricity supply. The entire staff of the Commissioners, including the area meter examining staff, number less than 150.

The Commissioners are empowered to make orders for the formation of joint electricity authorities, and it was contemplated that the country would be divided into electricity districts (16 was the number suggested). Economies were to be effected in respect of unified control in each district, under a joint electricity authority, of the generating equipment and main transmission systems in that district. The permissive powers under the 1919 Act proved to be difficult to apply, only four joint electricity authorities and five advisory boards were formed, and no attempt has been made in recent years to add to their number. Local jealousies, in which local authorities and companies were both concerned, proved to be obstacles in the way of the type of regionalization envisaged by the Departmental Committee on whose report the Act, as originally framed, was based. The need for re-organization on a national scale was the subject of further investigation by the Weir Committee in 1925, and a distinction was drawn between the two functions of production and retail distribution, resulting in the creation, under the Electricity Supply Act, 1926, of the Central Electricity Board to co-ordinate the generation and main transmission of electricity throughout the country.

Central Electricity Board

The Central Electricity Board is one of the largest of the public corporations of recent creation, but it differs from such bodies as the London Passenger Transport Board and the Port of London Authority in that it has no direct dealings with ordinary consumers of electricity (although it affords supplies to railways for traction purposes) but confines itself to the operation fo the Grid and the control of the selected generating stations and the sale in bulk of electricity to authorized distributors. If the 1919 Act had been passed in the form in which it was originally presented to Parliament, there might not have been a Central Electricity Board at all, because the District Boards which were to have been established under the general control of the Commissioners would have performed not only the functions now discharged by the Central Electricity Board but might also, in the course of time, have become wholly responsible for distribution in their districts. The Central Board comprises a Chairman and seven other members appointed by the Minister "after consultation with such representatives of local government, electricity, commercial, industrial, transport, agricultural, and labour interests as he thinks fit." Members are appointed for terms varying from five to ten years, and may be re-appointed. The system of appointment avoids direct representation, but ensures the selection of capable and experienced members. No member of the Board may at the time be a Member of Parliament nor may any whole time member have any financial interest in any company supplying or generating electricity or manufacturing or selling electrical machinery or plant for use in generation or transmission. The question of whole or part time appointment, except in the case of the Chairman, and of the amount of salary, is left to the decision of the Minister. Only the Chairman is in fact devoting his whole time to the work of the Board. The Central Electricity Board is neither a Government department nor a company directly accountable to shareholders. It is a statutory executive and operating body responsible, either by direct administration or by control, for the working of over £130,000,000 worth of plant and equipment.

The Grid

The Central Electricity Board carried into effect the Electricity Commissioners' scheme for the construction of main transmission lines—the Grid—to concentrate generation at standard frequency in a limited selected number of efficient stations and for supplying electricity in bulk to authorized undertakers for distribution. The actual construction of the Grid demanded the whole attention of the Board for the first few years, and it was not until about 1931 that it began trading operations.

The Grid comprises about 4,400 miles of main transmission lines, grouped under nine regional schemes covering the whole of Great Britain except the north of Scotland, and general trading under Grid tariffs in accordance with the 1926 Act is in progress by the Board in all the areas. The Grid is the property of the Board, and is in effect a pool from which the authorized distributors draw their supplies. The selected stations remain the property of the authorized undertakers, who sell the whole of their output to the Board for re-sale from the Grid to the distributors. While the Board does not own the generating stations the owners of any station which is made a selected station by a scheme prepared by the Commissioners and adopted by the Board are, by the 1926 Act, compelled to come into the scheme.

In planning the Grid, the Commissioners divided the country into regions and surveyed the generating stations in those areas, selecting the most efficient, scheduling a smaller number for temporary operation during a transitional period, and leaving the remainder to be eventually closed down. The proposals were passed on to the Central Electricity Board, which consulted the supply undertakers concerned, and interested parties were allowed to make representations before the schemes were finally adopted. The areas selected were North Scotland, Central Scotland, South Scotland, North-East England, North-West England and North Wales, Mid-East England, Central England, East England, South-East England, and South-West England and South Wales. For each area except North Scotland, regional schemes were so designed that they would connect into each other to complete a national network. Regard was had to the industrial characteristics of the areas.

When the Central Electricity Board started its work, electricity for public supply was produced in more than 500 generating stations belonging to authorized undertakings; but since the operation of the Grid the number has been reduced to about 350. By the original and subsequent amending schemes about 150 existing stations were made selected stations for operation in the nine areas, and provision was also made for the building of a small number of new selected stations. Power companies and some local authorities had already installed transmission systems, but these were often isolated from each other and required intercommunicating links, which have since been provided by the Grid system of the Board. The output of all the selected stations is purchased by the Board at cost of production, and authorized undertakers in the area (including the owners of the selected stations) who require electricity for distribution to the public are entitled to a supply directly or indirectly from the Board. Supplies afforded directly by the Board are normally charged at the Grid tariff for the area, but the owner of a selected station has the option of re-purchasing as much of the electricity produced at the station as he may require

at the adjusted cost of production, plus a proper proportion of the Board's expense in respect of the Grid. Owners of non-selected stations are not compelled to close down and buy from the Grid, unless the cost of the Grid supply is less than the cost of production at the stations, excluding capital charges. Works costs at most non-selected stations are lower than the Grid tariff, but the total production cost (works costs plus capital charges) usually exceeds the Grid tariff. Many of these stations still have some economic life, and it is mutually advantageous for the Board to supply the owner of such a station with his requirements and for the station to be operated under the direction of the Board for peak load and stand-by purposes, the Board paying an appropriate rental for its use, until, with the decrease of outstanding capital, the owner can purchase the whole of his requirements from the Grid and shut down his station.

A large proportion of the plant in selected stations which had been held in reserve and which could not have been fully remunerative under conditions of isolated operation was made available for revenue earning through the construction of the Grid. When all this released plant has been absorbed, further growth can be met at lower capital cost by reason of the smaller aggregate capacity required and the larger and more economical units of plant that can be installed. Formerly under independent operation the total plant in the generating stations was substantially in excess of the maximum demand upon it, but with the Grid in full operation, enabling generating plant to be effectually operated, a much greater proportion was able to be brought into effective use. Despite the Grid there are still outlying farms, hamlets, and small villages without any supply because under present conditions such extensions would not be economic propositions, but the financial problem has been rendered less formidable since the Grid has obviated the need for setting up extensive generating plant. Badly designed distribution systems are responsible for a high cost of current, and in some cases nothing short of a complete new distribution lay-out would bring such undertakings into line with the more efficient ones. In some places the local authorities have taken the "plums" of the densely populated urban areas, leaving the companies to operate the less populated and less remunerative zones.

Generation and transmission represents about two-fifths of the whole industry in terms of capital invested, the remaining three-fifths, being the capital invested in distribution, the retail trade of the industry, which is still in the hands of nearly 600 authorized distributors, of whom about three-fifths are local authorities and the rest companies. The share of the industry under the control of the Central Electricity Board is, however, of great magnitude, representating over £30,000,000 invested in the Grid, and £100,000,000 invested in the selected power stations. The Board is thus a unique instance of the control by a public concern of a large part of an industry whose retail side remains under local operation. The Board's head office is in London and there are district offices in Glasgow, Newcastle, Manchester, Leeds, Birmingham, London, and Bristol, accommodating district staffs responsible for the operation of the Grid in the nine areas (two areas being bracketed together in two instances).

Regionalization

As has already been mentioned, voluntary action failed to bring about a fulfilment of the original idea of regionalizing the whole industry under joint electricity authorities. There are, however, three of these bodies operating executively to-day—the London and Home Counties J.E.A., West Midlands J.E.A., and North-West Midlands J.E.A.—created under Orders made by the Electricity Commissioners, confirmed by the Ministry of Transport and approved by both Houses of Parliament. A fourth, the North Wales and South Cheshire J.E.A., has transferred its powers of supply to a power company operating in that district, but has advisory duties with regard to the organization of supply in the district. Although they have not developed on the lines anticipated, the joint electricity authorities have the advantage of certain co-ordinating powers in relation to the private and municipal undertakings within their areas.

The London and Home Counties J.E.A. was created in 1925 to "provide or secure the provision of a cheap and abundant supply of electricity" in an area of some 1,840 sq. miles comprising the whole of the counties of London and Middlesex and parts of six other counties. Large powers were vested in the authority relating to the erection and acquisition of generating stations and distribution systems, but the ideal of bringing the industry under unified control was not, and has not been, achieved. There are in fact about 62 electricity authorities in the area, some municipal and some company owned, and the J.E.A. itself is a somewhat unwieldy body of 37 members appointed or elected by the County Councils, local authority undertakers inside London and a number outside the county, company undertakers within the district, workers in the industry, and the railway companies. It is therefore possible for party politics to influence the selection of at least a part of the body. The J.E.A. supplies electricity in bulk to 13 authorized undertakers and operates 18 generating stations by arrangement with the authorized undertakings concerned to supply the electricity required by them for distribution in addition to bulk supplies from the Central Electricity Board. It also gives general supplies as a distributor in 23 boroughs and districts, and owns six distribution undertakings. It should be recorded that in those areas where it took over the distribution the J.E.A. was enabled to introduce standard rates considerably lower than those formerly offered. On the other hand, through lack of compulsory powers, neighbouring undertakings have remained outside the control of the authority.

The West Midlands J.E.A. which has 24 representatives from constituent bodies, authorized undertakers, colliery owners, workers in the industry, and railway companies, serves an area of 1,000 sq. miles, distributes direct to about 6,000 consumers in a mainly rural part of the area, and affords bulk supplies to a number of large undertakings. It built a generating station of its own and took over all the other public supply stations in its district. The North-West Midlands J.E.A., formed three years later, supplies electricity in bulk to authorized undertakers in the district and distributes in areas not already covered by authorized distributors. It has taken over two corporation generating stations and has constructed main transmission lines between those stations and the stations of other undertakers which were already in existence within the area for the purpose of giving the latter supplies in bulk. The future of joint electricity authorities would appear to lie mainly in the direction of developing their relatively small amount of retail distribution. There are also a few joint electricity boards, composed entirely of local authority members supplying electricity as distributors in their combined areas.

Individual undertakings in the electricity industry are of even greater variety than those in the Gas Industry. On the privately owned side there are small local companies subject to purchase by the local authority; power ompanies; composite companies partly subject to purchase; independent companies with no connexions with other companies; companies which are constituent members of a joint electricity authority so far as generation and main transmission is concerned but independent in distribution; distribution subsidiaries to other companies engaged largely in generation and bulk supply; companies which are operating as well as holding companies; holding companies controlling undertakings in certain limited areas; holding companies with interests scattered all over the country; and equipment manufacturing companies acting in the capacity of holding companies. Of the 575 distributing undertakings now operating, three-fifths are municipal and the rest are company-owned. Many have closed down their uneconomic generating stations since the advent of the Grid. Not more than 6% of them now operate independently of the Grid; about 18% buy in bulk but also generate part of their requirements, and all the other 75% deal exclusively through the Grid. Two-thirds of the companies are associated with or controlled by larger concerns, so that there are very few independent companies with no affiliations.

The McGowan Report

A landmark in the history of the electricity industry was the issue six years ago of the McGowan Report on Electricity Distribution. The Government announced its intention to legislate on the broad principles of the Report, but it has not yet done so. A White Paper was issued in 1937 setting out the main provisions proposed for the re-organization of distribution, and the views of the industry and representative bodies were invited. It was proposed to divide the country into 30 distribution districts comprising 76 or more groups possibly as many as 123—the present joint electricity authorities' districts being superseded. The Electricity Commissioners would, it was proposed, have power to vary the boundaries of the districts and would review all the undertakings in each district and prepare schemes for consolidation into a group or groups. They would have power to require the amalgamation of the undertakings in each group either by (*a*) acquisition by agreement or compulsorily by one undertaker of the other existing undertakings in the area covered by a scheme; (*b*) transfer of all existing undertakings in an area to a newly constituted distribution authority consisting of seven to twelve salaried members appointed by the Minister after consultation with local authorities and organizations representing industry and agriculture in the area; or (*c*) transfer of the undertakings of two or more local authorities to a newly constituted joint board. The schemes would provide as far as possible for the retention of the larger and more efficient undertakings and where possible would include an appropriate grouping of rural and urban areas.

With regard to the transfer of undertakings under (*a*) or (*b*) the purchase price was to be the sum of (1) cost of capital assets less depreciation on a scale to be fixed; (2) stocks and stores at a valuation; (3) for local authorities, the outstanding liability in respect of any other expenses properly liquidated over a period of years; (4) for companies, compensation for the loss during the unexpired period of the company's tenure of future profits. Existing rights of local authorities to purchase company undertakings would be rescinded and new rights of purchase would be given to existing or new public bodies, provided that a company's tenure of a consolidated undertaking should not exceed fifty years. Company undertakings retained would be subject to control by a sliding scale of prices and profits and in respect of the issue of new capital. Other forms of control were proposed to be applied to authorized undertakers in general.

It has been suggested to us that a reprint of these articles, when they are complete, would be valuable to many for permanent reference. Owing to paper scarcity it would be necessary for us to have some idea of the demand before proceeding, and we shall be glad to have a post-card from anybody interested. Single copies would not be likely to cost more than one shilling.

THE STRUCTURE AND FINANCE OF THE TWO-PART TARIFF*

By A. F. POLLOCK, M.A., B.Com., C.A.
EDINBURGH

(*Concluded from p. 359*)

Statistical Tables and Their Use

The basis of classification having been decided upon, the statistical tables were then compiled. A specimen table showing the annual consumption groups for three-roomed houses with ordinary meters is reproduced in Appendix 3, and this table will be used to illustrate the method of determining the loss of revenue which might be expected from the application of what we might call the tentative tariff already outlined—*i.e.*, with service charge at the flat rate of 7s. per room per annum and commodity charge of 3.7d. per therm. This should bring out more clearly the possible defects of this type of service charge.

The first step is to determine at what point of consumption it will pay the consumer to transfer to the two-part tariff system of charge. This is the point at which the two price systems result in the same charge to the consumer, and can be readily determined by the formula

$$X \times R = X \times C + S$$

where X = the critical consumption to be determined.
R = Rate per therm on existing scale (which is shown in detail in Appendix 4).
C = Commodity Charge on two-part tariff.
S = Service Charge on two-part tariff.

The formula applied to the two-part tariff (in Appendix 2) gives the following result:

$$X \times 6.947 = X \times 3.7 + 21s.$$
$$\text{or } X = 77.6$$

Critical consumption is therefore 77.6 therms per annum. This is equivalent to 16,300 cu.ft., and the nearest consumption group on the table is therefore 16,000/17,000 cu.ft. The revenue from the whole class of consumers occupying three-roomed houses can now be determined, first on the existing method of charge and secondly on the existing basis for consumers using less than 16,000/17,000 cu.ft. per annum and on the two-part tariff basis for consumers using more. The difference between the first and second calculations will give the possible loss for this class of consumer, and the total possible loss can be determined by repeating the process for each class of consumer. A specimen calculation for three-roomed houses with ordinary meters and a summary of the results determined for each size of house for both ordinary and prepayment consumers are given in Appendices 5 and 6 respectively.

Defects of Using only the Number of Rooms as a Measure of Service Costs

It will be seen that the loss is some £61,000 or fully 17% of the total revenue. For the moment, however, the interest lies rather in the distribution of the loss. Prepayment consumers as a whole absorb no less than 28.66% of the original prepayment revenues as compared with the ordinary consumer percentage of 11.7. This is mainly accounted for by the higher rate charged under the existing tariff to prepayment consumers—who, as shown in Appendix 4, paid on a flat rate at almost 1d. per therm more than the ordinary consumer under the first block—but also partly by the higher average consumption of prepayment consumers in houses up to five rooms in size. It is of particular interest to note that, broadly speaking, the smaller the house, the larger the proportion of consumers who benefit under the two-part tariff and the greater the proportion of the original revenue lost to the undertaking. This indicates that the benefits of the tariff are not being equitably shared by all classes of consumers, and that the appeal of the tariff is being restricted to the smaller houses owing to defective distribution of the service charge.

Alternative Measure of Service Costs

The remedy for the defect seems to be in substituting for the simple average service charge per room some sort of weighted average, and the problem is to find some suitable means of determining the weights to be used. The table (Appendix 7) of average consumptions for the various sizes of house suggests a method of doing this, but the table itself requires some word of explanation. It will be seen that three types of average are given:

(1) The mean or simple arithmetic average.
(2) The median, which is the consumption of the middle consumer in each class (*i.e.*, there are 50% of the consumers with consumptions below this figure and 50% with consumptions above).
(3) The mode, which is the most common or most characteristic consumption of the class.

The reason for considering averages other than the mean is that the mean is unduly affected by abnormal consumptions at either end of the scale, while the median is only slightly affected, and the mode not at all.

Now it is a reasonable assumption that the most characteristic or most common kind of gas installation in domestic premises is for cooking; therefore the characteristic consumption brought out by the table of averages should fairly represent the consumption for normal cooking requirements—*i.e.*, the base load of the domestic market. If, then, the two-part tariff service charge is related to the normal base load for each size of house it should come as near as an be to the ideal promotional tariff. This leads to the conclusion that the modal consumptions for each size of house should be taken as the weights for determining the service charge.

When we come to apply the principle we find that the modal averages behave as they might be expected to so far as ordinary meter consumers are concerned, rising steadily (though not proportionately) with the size of house. In the prepayment section, however, they vary erratically, and become indeterminate for the larger sizes of house, thus inviting the conclusion that consumption through prepayment meters is hardly affected by the size of house at all. This conclusion has been accepted, and instead of using separate weights for each size of house, a standard weight of 15,000 (the approximate average of the weights for all the sizes of house up to four rooms, which are the only ones that matter) has been used for all prepayment consumers.* Appendix 8 shows the method of calculating the unit of service charge and the actual charge for each size of house.

A summary of the results of using the new service charges in the calculation of the loss to be expected in the application of the revised tariff is shown in Appendix 9.

Results of Using the Revised Rates of Service Charge

The results of using the revised rates of service charge may be briefly summarized as follows:

(1) The total loss in revenue is less principally because of the heavier "weights" placed against the prepayment consumers and the smaller houses.

(2) The financial losses and corresponding benefits to the consumers are more evenly spread throughout the various classes.

(3) There is still some disparity between the benefits (as represented by the percentage losses in revenue) to the various classes of consumer, but this is equitable and exactly as it should be. A column headed "Difference between Mean and Modal Consumption" is added at the end of the table (Appendix 9). This shows the difference between the mean consumption and the modal consumption for each group. The greater this difference, the greater is the proportion of consumers with consumptions in excess of the modal or standard consumption, and the greater therefore their legitimate claim upon the benefits to be distributed. The table shows clearly that this claim has been fairly met because the greater the difference between the mean and the mode in the respective classes, the greater is the benefit to the class.

Summary

(1) The suggestions of the 1925 Committee on Gas Charges of the National Gas Council have been accepted as a reasonable method of analysing costs between service and commodity.

(2) That analysis having been accepted, it remains to determine how service costs are to be distributed between the different classes of consumers, in particular domestic consumers, with whom this investigation was especially concerned.

(3) It has been assumed in the first instance in order to separate domestic and non-domestic service costs that with four times the average consumption of the domestic consumer, the non-domestic consumer could be expected to carry service costs at least 50% higher. Owing to the extreme difficulty of segregating the actual costs of service to non-domestic consumers this is an assumption which could only be verified or disproved by experience, but even if it is quite considerably inaccurate, the inaccuracy is not material where the proportion of non-domestic consumers and their consumption is small in comparison to the total.

(4) A statistical analysis of consumers' records showed that there is a tendency for the consumption of domestic consumers to vary with the size of house, size being measured by the number of rooms.

(5) This variation is not, however, either consistent or in direct proportion to the number of rooms, and a tentative two-part tariff with a service charge proportional to the number of rooms was found

* Paper to the North British Association of Gas Managers.

* If it is contended that service is more costly for prepayment than ordinary consumers, this weight could be increased.

to result in an inequitable distribution, among the various classes of consumer, of the benefits of the tariff.

(6) The table of average consumptions per consumer suggested that it might be better to distribute service costs against each size of house, not according to the number of rooms, but rather in proportion to the characteristic consumption, using the modal consumptions as "weights" for determining the unit of service charge. A two-part tariff with service charge determined in this way showed the distribution of the benefits to consumers to be fair and equitable.

(7) Any optional two-part tariff which is designed to stimulate the

APPENDIX NO. 3.—Analysis of Consumers' Ledgers. Annual Consumptions of Domestic Consumers. Ordinary Meters—3-Roomed House—C.V. 475 B.Th.U. per 1,000 cu.ft.

1.	2.		3.		4.		5.	
					Cumulative of Column 2.		Cumulative of Column 3.	
Consumption Group. (1,000's cu.ft.) See footnote.	Number of Consumers in each Group.	Percentage of Total Consumers in each Group.	Actual Consumption of all Consumers in each Group. (100's cu.ft.)	Percentage of Total Consumption of Class.	Number of Consumers.	Percentage of Total.	Consumption. (100's cu.ft.).	Percentage of Total.
0	74	0.347	302	0.008	74	0.347	302	0.008
1	160	0.750	2,225	0.060	234	1.097	2,527	0.068
2	276	1.293	6,736	0.183	510	2.390	9,263	0.251
3	341	1.597	11,757	0.319	851	3.987	21,020	0.570
4	432	2.024	19,083	0.514	1,283	6.011	40,103	1.087
5	580	2.717	31,422	0.852	1,863	8.728	71,525	1.939
6	671	3.144	42,859	1.162	2,534	11.872	114,384	3.101
7	787	3.687	58,267	1.579	3,321	15.559	172,651	4.680
8	779	3.650	65,497	1.775	4,100	19.209	238,148	6.455
9	902	4.226	84,853	2.300	5,002	23.435	323,001	8.755
10	898	4.207	93,376	2.531	5,900	27.642	416,377	11.286
11	1,014	4.751	115,531	3.131	6,914	32.393	531,908	14.417
12	938	4.395	116,245	3.151	7,852	36.788	648,153	17.568
13	979	4.587	131,154	3.555	8,831	41.375	779,307	21.123
14	988	4.629	142,260	3.856	9,819	46.004	921,567	24.979
15	969	4.540	149,221	4.044	10,788	50.544	1,070,788	29.023
16	995	4.662	163,160	4.422	11,783	55.206	1,233,948	33.445
17	943	4.418	164,147	4.449	12,726	59.624	1,398,095	37.894
18	787	3.687	144,782	3.924	13,513	63.311	1,542,877	41.818
19	797	3.734	154,481	4.187	14,310	67.045	1,697,358	46.005
20	773	3.621	157,533	4.270	15,083	70.666	1,854,891	50.275
21	680	3.186	145,303	3.938	15,763	73.852	2,000,194	54.213
22	621	2.909	139,091	3.770	16,384	76.761	2,139,285	57.983
23	551	2.581	128,909	3.494	16,935	79.342	2,268,194	61.477
24	538	2.521	131,278	3.558	17,473	81.863	2,399,472	65.035
25	436	2.043	110,722	3.001	17,909	83.906	2,510,194	68.036
26	363	1.701	95,796	2.596	18,272	85.607	2,605,990	70.632
27	355	1.663	97,290	2.637	18,627	87.270	2,703,280	73.269
28	335	1.570	95,068	2.577	18,962	88.840	2,798,348	75.846
29	279	1.307	82,010	2.223	19,241	90.147	2,880,358	78.069
30	247	1.157	75,051	2.034	19,488	91.304	2,955,409	80.103
31	192	0.900	60,234	1.632	19,680	92.204	3,015,643	81.735
32	188	0.881	60,858	1.649	19,868	93.085	3,076,501	83.384
33	180	0.843	60,151	1.630	20,048	93.928	3,136,652	85.014
34	177	0.829	60,847	1.649	20,225	94.757	3,197,499	86.663
35	130	0.609	46,031	1.248	20,355	95.366	3,243,530	87.911
36	111	0.520	40,391	1.095	20,466	95.886	3,283,921	89.006
37	115	0.539	43,001	1.165	20,581	96.425	3,326,922	90.171
38	84	0.393	32,301	0.875	20,665	96.818	3,359,223	91.046
39	65	0.305	25,598	0.694	20,730	97.123	3,384,821	91.740
40	69	0.323	27,891	0.756	20,799	97.446	3,412,712	92.496
41	60	0.281	24,836	0.673	20,859	97.727	3,437,548	93.169
42	57	0.267	24,108	0.653	20,916	97.994	3,461,656	93.822
43	46	0.215	19,961	0.541	20,962	98.209	3,481,617	94.363
44	49	0.229	21,745	0.589	21,011	98.438	3,503,362	94.952
45	51	0.239	23,160	0.628	21,062	98.677	3,526,522	95.580
46	30	0.141	13,924	0.377	21,092	98.818	3,540,446	95.957
47	16	0.075	7,588	0.206	21,108	98.893	3,548,034	96.163
48	26	0.122	12,588	0.341	21,134	99.015	3,560,622	96.504
49	18	0.084	8,886	0.241	21,152	99.099	3,569,508	96.745
50	14	0.065	7,050	0.191	21,166	99.164	3,576,558	96.936
51	17	0.079	8,742	0.237	21,183	99.243	3,585,300	97.173
52	19	0.089	9,980	0.270	21,202	99.332	3,595,280	97.443
53	19	0.089	10,146	0.275	21,221	99.421	3,605,426	97.718
54	14	0.065	7,604	0.206	21,235	99.486	3,613,030	97.924
55	8	0.037	4,440	0.120	21,243	99.523	3,617,470	98.044
56	4	0.019	2,252	0.061	21,247	99.542	3,619,722	98.105
57	8	0.037	4,592	0.124	21,255	99.579	3,624,314	98.229
58	3	0.014	1,746	0.047	21,258	99.593	3,626,060	98.276
59	4	0.019	2,380	0.065	21,262	99.612	3,628,440	98.341
60	9	0.042	5,456	0.148	21,271	99.654	3,633,896	98.489
61	3	0.014	1,850	0.050	21,274	99.668	3,635,746	98.539
62	7	0.033	4,368	0.118	21,281	99.701	3,640,114	98.657
63	4	0.019	2,538	0.069	21,285	99.720	3,642,652	98.726
64	7	0.033	4,494	0.122	21,292	99.753	3,647,146	98.848
65	1	0.005	658	0.018	21,293	99.758	3,647,804	98.866
66	2	0.009	1,322	0.036	21,295	99.767	3,649,126	98.902
67	3	0.014	2,022	0.055	21,298	99.781	3,651,148	98.957
68	1	0.005	680	0.018	21,299	99.786	3,651,828	98.975
69	4	0.019	2,778	0.075	21,303	99.805	3,654,606	99.050
70	1	0.005	700	0.019	21,304	99.810	3,655,306	99.069
71	2	0.009	1,428	0.039	21,306	99.819	3,656,734	99.108
72	2	0.009	1,448	0.039	21,308	99.828	3,658,182	99.147
74	4	0.019	2,976	0.081	21,312	99.847	3,661,158	99.228
75	1	0.005	758	0.021	21,313	99.852	3,661,916	99.249
76	1	0.005	766	0.021	21,314	99.857	3,662,682	99.270
77	3	0.014	2,322	0.063	21,317	99.871	3,665,004	99.333
78	3	0.014	2,352	0.064	21,320	99.885	3,667,356	99.397
79	3	0.014	2,378	0.064	21,323	99.899	3,669,734	99.461
80	1	0.005	808	0.022	21,324	99.904	3,670,542	99.483
83	1	0.005	836	0.023	21,325	99.909	3,671,378	99.506
84	1	0.005	842	0.023	21,326	99.914	3,672,220	99.529
85	3	0.014	2,560	0.069	21,329	99.928	3,674,780	99.598
88	1	0.005	885	0.024	21,330	99.933	3,675,665	99.622
90	1	0.005	900	0.024	21,331	99.938	3,676,565	99.646
91	2	0.009	1,824	0.049	21,333	99.947	3,678,389	99.695
92	2	0.009	1,846	0.050	21,335	99.956	3,680,235	99.745
93	1	0.005	936	0.025	21,336	99.961	3,681,171	99.770
95	1	0.005	954	0.026	21,337	99.966	3,682,125	99.796
98	2	0.009	1,970	0.053	21,339	99.975	3,684,095	99.849
102	1	0.005	1,026	0.028	21,340	99.980	3,685,121	99.877
105	1	0.005	1,056	0.029	21,341	99.985	3,686,177	99.906
108	1	0.005	1,080	0.029	21,342	99.990	3,687,257	99.935
111	1	0.005	1,114	0.030	21,343	99.995	3,688,371	99.965
130	1	0.005	1,300	0.035	21,344	100.000	3,689,671	100.000

Note.—It should be understood the figures in Column 1 represent the lower limit of the consumption group—*e.g.*, 0 means 0 to 1, 1 means 1 to 2, and so on.

APPENDIX NO. 4.—Scales of Gas Charges in Operation at Date of Investigation.

Consumption over a Period of approximately Three Months through One Meter. (Ordinary meters.)	First 10,000 cu.ft. Per 1,000 cu.ft.	First 10,000 cu.ft. Per Therm.	Remainder at *one* of the following Prices. Per 1,000 cu.ft.	Remainder at *one* of the following Prices. Per Therm.
Consumption up to 10,000 cu.ft.	2/9	6.947d.	—	—
Over 10,000 and up to 50,000 cu.ft.	2/9	6.947d.	2/6	6.316d.
„ 50,000 „ 100,000 „	2/9	6.947d.	2/3½	5.789d.
„ 100,000 „ 250,000 „	2/9	6.947d.	2/1½	5.368d.
„ 250,000 „ 500,000 „	2/9	6.947d.	1/11½	4.947d.
„ 500,000 „ 750,000 „	2/9	6.947d.	1/10	4.632d.
„ 750,000 „ 1,000,000 „	2/9	6.947d.	1/9	4.421d.
„ 1,000,000 cu.ft....	2/9	6.947d.	1/6	3.789d.
Prepayment Meters.	Flat rate of 3/1.62 per 1,000 cu.ft. (7.92d. per therm).			

No meter rents are charged.

The scale was shortly afterwards modified by reducing the first block from 10,000 cu.ft. to 5,000 cu.ft., and making the next step "over 5,000 up to 100,000 cu.ft.," so that consumption over 5,000 cu.ft. qualified for the rate of 2/3½d. per 1,000 cu.ft., the intermediate step at the 2/6d. rate being cut out. The new scale applied to prepayment consumers as well, except that the price for the first block was 2/10½d. (7.263d. per therm) instead of 2/9d. per 1,000 cu.ft.

APPENDIX NO. 5.—Calculation of Gas Revenue from Consumers Occupying 3-Roomed Houses (Ordinary Meters).

(a) *On basis of Block and Step Tariff (Appendix No. 4).*

Consumption Group. Per Quarter.	Per Annum.	Number of Consumers.	Consumption. At 6.947d. per Therm.		At 6.316d. per Therm.		Total (see Col. 5 of Appendix 3.)
1,000's cu.ft.	1,000's cu.ft.		1,000's cu.ft.	Therms.	1,000's cu.ft.	Therms.	1,000's cu.ft.
Up to 10	Up to 40	20,799	341,271.2	1,621,038	—	—	341,271.2
10 to 50	40 to 200	545	21,800.0	103,550	5,895.9	28,006	27,695.9
Totals		21,344	363,071.2	1,724,588	5,895.9	28,006	368,967.1
Total Revenue		—	—	£49,922	—	£737	£50,659

(b) *On basis of Voluntary Two-Part Tariff* with Service Charge £1 1s. per annum (7/- per room) and Commodity Charge 3.7d. per therm.

(i) Revenue from Consumers using up to 16/17,000 cu.ft. per annum who would elect to remain on existing tariff:

Number of Consumers.	Consumption. 1,000's cu.ft.	Therms.	Rate.	Total Revenue.
11,783	123,394.8	586,125	6.947d.	£16,967

(ii) Revenue from Consumers using over 16/17,000 cu.ft. per annum who would benefit by adopting two-part tariff:

Number of Consumers.	Consumption. 1,000's cu.ft.	Therms.	Revenue. Service Charge at 21/- per Consumer.	Gas at 3.7d. per Therm.	
9,561	245,572.3	1,166,468	£10,039	£17,983	£28,022
					£44,989
		Revenue as per (a) above			£50,659
		Difference—Possible Loss to Undertaking ...			£5,670

APPENDIX NO. 6.—Summary of Calculations of Possible Financial Loss on All Sizes of House Resulting from the Application of the Two-Part Tariff (Appendix No. 2).

Size of House. (Rooms.)	Financial Loss.	Original Revenue. (Existing Tariffs.)	Per cent. Loss of Revenue.	Percentage Consumers Benefiting by Two-part Tariff.
Ordinary Meters.	£	£		
1	679	2,346	28.94	74.11
2	5,045	30,721	16.42	66.99
3	5,670	50,659	11.19	44.79
4	4,231	49,006	8.63	34.79
5	2,674	31,837	8 40	29.71
6	1,850	20 284	9.12	31.95
7	8,749	62,055	14.10	45.21
	£28,898	£246,908	11.70	
Prepayment Meters.				
1	4,071	10,545	38.61	89.38
2	18,010	56,199	32.05	89.43
3	8,123	35,632	22.80	70.17
4	1,427	7,237	19.72	60.18
5	236	1,241	19.02	59.16
6	55	417	13.19	52.04
7	49	292	16.78	48.28
	£31,971	£111,563	28.66	
Totals	£60,869	£358,471	17%	

APPENDIX NO. 7.—SHOWING AVERAGE CONSUMPTIONS OF GAS OF DOMESTIC CONSUMERS CLASSIFIED ACCORDING TO SIZE OF HOUSE.

Size of House. (Rooms.)	Total Number of Consumers.	Total Gas Consumption. (Millions cu.ft.)	Average Consumptions. (1000's cu.ft.) Mean.	Median.	Mode.
1.	2.	3.	4.	5.	6.
Ordinary Meters.					
1	1,314	17	13	9	7
2	14,875	224	15	13	12
3	21,344	369	17	15	14
4	17,939	358	20	17	16
5	9,513	233	25	20	18
6	4,952	150	30	24	20
7 and over	9,984	468	47	34	24
Prepayment Meters.					
1	4,568	67	15	13	13
2	17,581	359	20	19	16
3	11,565	227	20	17	15
4	2,024	46	23	20	14
5	289	8	27	24	23
6	98	3	27	26	Indeterminate
7 and over	58	2	32	28	Do.

Note.—Reference to Appendix No. 3 will help to explain how the Median and Mode are determined.

The Median being the consumption of the middle consumer is found by dividing the total number of consumers, 21,344, by 2 = 10,672, and finding from the table, Column 4, the group in which the 10,672nd consumer falls. He must fall in the group opposite No. 15 in Column 1, which starts at 9,820 and goes up to 10,788 Therefore, 15,000 cu.ft. is the median consumption.

The Mode would normally be the consumption opposite the largest individual group of consumers in Column 2 of the table. This happens to be in this case 11, opposite which is the number 1,014, but it will be noticed that the numbers in Column 2 following 1,014 tend to be higher than those before it, so that the "pull" of the mode is to higher levels. An adjustment must therefore be made by a process of re-grouping of Column 1 figures in pairs, threes, and so on to find the true mode, which turns out to be 14, and not 11.

APPENDIX NO. 8.—METHOD OF CALCULATING WEIGHTED SERVICE CHARGE.

Number of Consumers.	Weights (see Col. 6, Appendix No. 7).	Product.
Ordinary Meters.		
1,314	7	9,198
14,875	12	178,500
21,344	14	298,816
17,939	16	287,024
9,513	18	171,234
4,952	20	99,040
9,984	24	239,616
79,921		
Prepayment Meters.		
36,183	*15	542,745
		1,826,173

Total Service Costs per Appendix No. 1 ... £165,487

Deduct Non-domestic service charges. 12,000 consumers at 24/8 + 50% = 37/- £22,200

£143,287

Unit of Service Charge £143,287 / 1,826,173 = 1/7d.

Service Charges.

Size of House. (Rooms.)	Unit of Service Charge.	Weight.	Revised Service Charge.	Service Charge on Room Basis. Appendix 2.
Ordinary Meters.				
1	1/7	7	11/1	7/-
2		12	19/-	14/-
3		14	22/2	21/-
4		16	25/4	28/-
5		18	28/6	35/-
6		20	31/8	42/-
7		24	38/-	49/-
Prepayment Meters.				
All sizes	1/7	15	23/9	As for Ordinary.

* Approximate Average for all sizes of House up to four.

APPENDIX NO. 9.—SUMMARY OF CALCULATIONS OF POSSIBLE FINANCIAL LOSS ON ALL SIZES OF HOUSE RESULTING FROM APPLICATION OF REVISED TARIFF WITH SERVICE CHARGE RELATED TO MODAL GAS CONSUMPTION.

Size of House. (Rooms.)	Financial Loss. £	Financial Loss. Percentage of Original Revenue.	Percentage of Consumers benefiting.	Difference between Mean and Modal Consumptions.
Ordinary Meters.				
1	500	21	61	6
2	2,962	10	49	3
3	5,102	10	45	3
4	5,154	11	45	4
5	3,855	13	47	7
6	2,898	14	53	10
7	11,662	19	62	23
	32,133	13	49	
Prepayment Meters.				
1	1,347	13	50	—
2	10,969	20	73	5
3	7,031	20	66	5
4	1,705	24	71	8
5	348	28	78	12
6	115	28	82	12
7	95	33	72	17
	21,610	19	66	
Total	53,743	15	55	

sale of gas is likely to show a financial loss on paper. Whether it will do so in practice will depend partly upon the number of consumers who adopt it and partly upon the extent to which those who do adopt it increase their consumption of gas.

(8) If the paper loss can be controlled by adjusting the service charge or the commodity charge or both, but the higher these charges become, the smaller will be the number of consumers to whom the tariff will make an immediate appeal.

(9) If the modal consumption be accepted as the principal determining factor in the distribuion of the service charge, the statistical analyses of consumers' records need not be nearly so elaborate as those compiled for the present investigation. All the necessary information could be obtained from a representative sampling of, say, 10% of the consumers, a task which would present little difficulty even to an undertaking having only limited facilities for mechanical statistical work.

Conclusion

A good deal of heat has sometimes been generated in the past by discussions on gas tariffs, because opinions differed as to the merits of different kinds of tariff. Every endeavour has been made in describing this investigation to avoid any expression of opinion and to present the results and conclusions as objectively as possible. The purpose of the investigation has been to elucidate the facts, from them to determine the general principles, if any, upon which a sound and equitable domestic two-part tariff might be built, and to show how this can be done scientifically and yet without the need for over-elaborate and costly statistical preparation.

"Specification," 1942

[Reviewed by "Critic"]

The 44th Edition of *Specification* (The Architectural Press, Ltd., 45, The Avenue, Cheam, Surrey, 15s.) is on much the same useful and compact lines as in 1941. The policy of compressing and condensing this publication has again been adopted in view of the restrictions on the use of paper; although the number of pages has been reduced by approximately one-third, the 1942 Edition contains much that was not included in 1941.

Although appeals have been made in previous reviews which have appeared in the "JOURNAL" for a properly co-ordinated "Gas Engineer" section on similar lines to the "Electrical Engineer" section, apparently nothing has been done in this direction.

Air conditioning receives some attention, but modern apparatus such as gas refrigerators and gas-heated overhead radiant panels have not yet been given proper publicity in this excellent medium which may do much to influence post-war building design. Solid fuel fired cooking equipment is well advertised and such practical and informative advertising must surely take a trick with the architect, probably to the disadvantage of gas interests.

The tabulation of the physical properties of the various available proprietary articles such as insulating and wall boards is of special interest at the present time when every possibility of effecting fuel economy must receive full consideration. One advertiser points out that the thermal transmittance of a corrugated roof can be reduced from 1.4 to 0.37 B.Th.U. per sq.ft. per hour per °F. by the use of a ½ in. thick insulating lining. Assuming the roof surface to be 100,000 sq.ft. in area and a temperature difference of 30° F. through the roof, then the reduction in heat loss is claimed to represent over 3 million B.Th.U. per hour. The insulation of roofs and walls certainly assumes greater importance when viewed in this way. This example is typical of the helpful and practical advertising which is encouraged by the publishers of *Specification*.

The comprehensive A.R.P. section is again included, and the publication as a whole is sure to find its usual wide circle of readers among those wishing to keep in touch with modern building practice.

Welding Research

The Institute of Welding has issued the Fifth Progress Report of its Welding Research Council, containing a five-year review of the work already carried out, and with some news about projected work and outstanding problems. The report is published at 5s. by the Institute of Welding, 2, Buckingham Palace Gardens, London, S.W. 1.

It contains a general summary of the Institute's activities in the year ended March 31, and following that a lengthy summary of the research investigations of the committees and sub-committees during the past five years. Among the subjects dealt with in the reports are: The weldability of ferrous metals, high tensile structural steels and steels for pressure equipment, alloy steels, cast-iron and non-ferrous metals; machinery; welded construction; pressure vessels; resistance welding; and the spot welding of ferrous metals and of light alloys.

Also included are the personnel of the Research Committees and Sub-Committees, lists of members, and a finance statement for the five-year period ended March 31.

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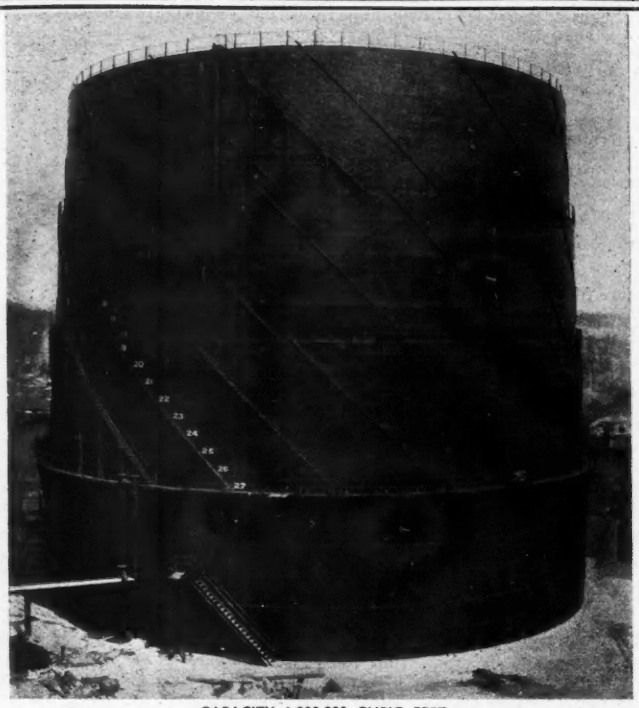

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Gas Products Prices

The London Market Sept. 7.

The only change in the prices of Coal Tar Products in the London Market refers to 95/160 Solvent Naphtha, which is now about 2s. 3d. to 2s. 7d. per gallon.

The Provinces Sept. 7.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 1s. to 1s. 4d. according to quality. Solvent naphtha, naked, North, 2s. 2d. to 2s. 6d. Heavy naphtha, North, 1s. 10d. to 1s. 11d. Carbolic acid, 60's, controlled by the Coal Tar Acids Prices (Inland) Order, 1942, operative from May 1. Naphthalene, controlled by the Naphthalene prices (Inland) Order, 1942, dated April 15, 1942, and operative from May 1, 1942, £19 to £19 10s.—bags free. Anthracene, controlled by the Anthracene Prices (Inland) Order, 1942, operative from May 1. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5½d; timber preservation and other purposes 4¾d. to 6d. These prices apply as from May 13.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland Sept. 5.

Throughput is well maintained. Refined tar controlled. Value about 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6¾d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6¾d. to 7d. per gallon; all *ex* Works in bulk. Cresylic acid continues active at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha 6½d. to 7d. Solvent naphtha: 90/160 grade, 2s. to 2s. 3d. and 90/190 Heavy naphtha, 1s. 9d. to 2s. per gallon. Pyridine: 90/160 grade, 13s. and 90/140 grade, 15s. per gallon.

TRADE CARDS

FULL particulars of these spaces can be obtained on application to the Publishers. They are designed principally for the use of the firms whose display advertisements cannot be included owing to paper rationing.

NATIONAL ENAMELS LTD.

53, Norman Road, Greenwich, London, S.E.10. **T/N** Greenwich 2266–7.

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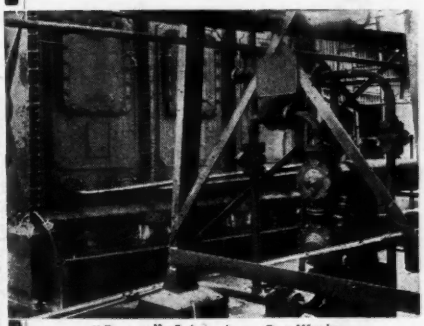

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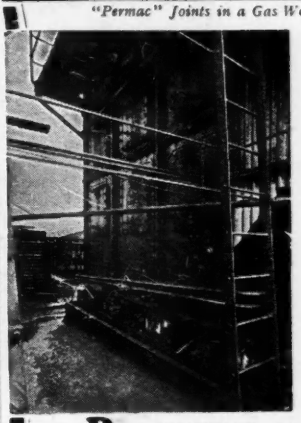

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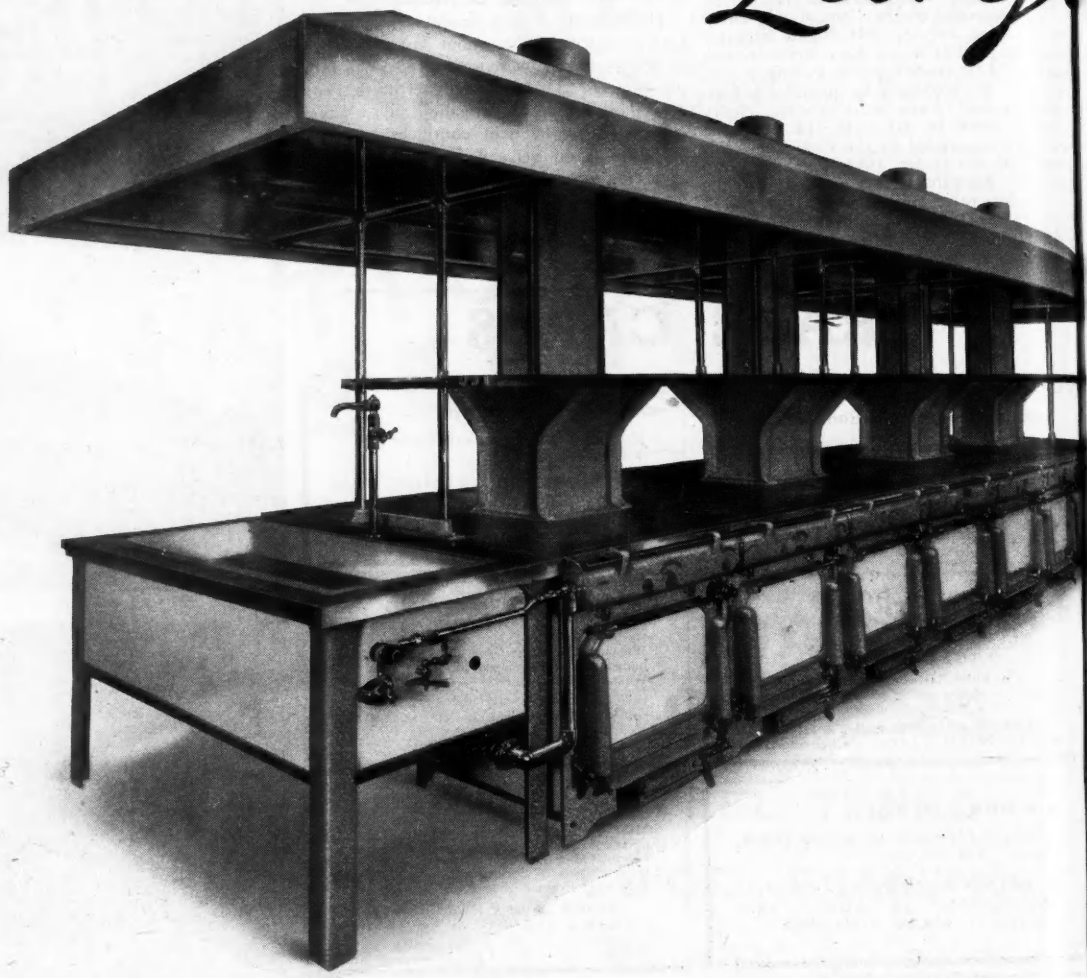

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GAS STOCKS AND SHARES

Markets were a little brighter at the opening last week, but in the absence of any encouraging news the volume of business eventually dwindled to very small proportions. Conditions were similar in the Gas Market and the number of transactions was less than usual, although the undertone remained firm. Price changes were also fewer than of late and it will be seen that Gas Light units, which have been steady at 13s. 6d. for some weeks past, reacted slightly and Newcastle units followed suit on the local Exchange. Compared with previous months, prices during August continued steady although there were not so many appreciations in value. The outstanding features were the rise of 9 points in Bournemouth maximum stock and 11 in Croydon sliding scale. On the other hand, Liverpool ordinary reacted 9 on the reduction in the interim dividend from 3% to 2½%.

The following price changes occurred during the week:

OFFICIAL LIST

Associated Gas & Water Undertakings Ord.	16/9—17/9	+-/3d.
Gas Light Units	12/9—13/9	--/3d.
Ditto 3 p.c. Deb.	79—84	—1
South-Eastern Gas Corporation 4 p.c. Pref.	13/6—15/6	+1/-
South Suburban 5 p.c. Pref.	96—102	+2
United Kingdom Gas Corporation 3½ p.c. Red. Deb.	90—95	+1

SUPPLEMENTARY LIST

Newcastle Units	19/6—20/6	--/3d.
Sheffield Ord. (x.d.)	126—128	Aug. 24

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 4.
1,767,439	Mar. 9	5	5	Alliance & Dublin Ord. ...	98—103
374,000	June 29	4	4	Do. 4 p.c. Deb.	94—99
972,345	May 11	5	5	Asscd. Gas & Water U'd'ts Ord.	16/9—17/9
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/—17/-
535,545	,,	4	4	Do. 4 p.c. Red. Cum Pref.	15/6—17/6
341,966	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/—15/-
561,370	Aug. 24	7	7	Barnet Ord. 7 p.c.	125—130
300,000	May 18	1/4⅜	1/9⅜	Bombay, Ltd.	18/6—20/6
690,407	Aug. 17	7	7	Bournemouth 7 p.c.max. ...	134—139
362,025	June 15	4	4	Do. 4 p.c. Deb. ...	98—103
459,955	Mar. 2	2½	3½	Brighton, &c., 5 p.c. Con. ...	72—77
455,000	,, 16	6	6	Brit. Gas Light Ord.	72—77
545,000	June 29	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	105—115
120,000	June 15	4	4	Do. 4 p.c. Red. Deb.	77—82
10,000	Nov. 6 '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	1¼—2½
626,860	July 13	6	6	Cardiff Con. Ord.	100—105
24,500	June 8	7	7	Colombo 7 p.c. Pref.	19/—21/-
764,169	Mar. 23	-/11.48	-/9.56	Colonial Gas Assn. Ltd. Ord. ...	¼—¼
400,000	,,	1/3.30	1/3.298	Do 8 p.c. Pref. ...	¼—¼
1,748,935	July 22 '40	2	3	Commercial Ord.	34—39
620,000	June 8	3	3	Do. 3 p.c. Deb.	58—63
286,344	Aug. 17	5	5	Do. 5 p.c. Deb.	95—100
807,560	,, 24	6	6	Croydon sliding scale	108—113
644,590	,,	5	5	Do. max. div.	83—88
620,385	June 29	5	5	Do. 5 p.c. Perp. Deb. ...	108—113
179,500	Aug. 17	5	5	East Surrey 'B,' 5 p.c.	80—85
176,461	June 29	5	5	Do. 5 p.c. Deb. (Irred.)...	107—112
250,000	July 13	4	6	Gas Consolidation Ord. 'B' ...	15/—17/-
250,000	May 11	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6
19,122,910	July 29 '40	3⅜	4½	Gas Light & Coke Ord. ...	12/9—13/9a
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	50—55
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	66—71
2,993,000	July 8 '40	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	72—77
8,602,497	June 1	3	3	Do. 3 p.c. Con. Deb. ...	79—84
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	104—108
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	103—107
700,000	Mar. 9	3½	3½	Do. 3½ Red. Deb. ...	89—94
5,600,000	May 13 '40	4	8	Imperial Continental Cap. ...	63—68
43,820	July 27	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95
231,978	Aug. 24	5	5	M.S. Utility 'C' Cons.	75—80
918,657	,,	4	4	4 p.c. Cons. Pref.	78—83
675,000	May 4	†4	†4	Montevideo, Ltd.	82—87
300,000	April 27	9	7	Oriental, Ltd.	80—90
368,537	June 15	3½	2½†	Plymouth & Stonehouse 5 p.c.	65—70
621,667	Aug. 17	7½	7½	Portsmouth & Gosport Cons.	92—97
648,999	May 26	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	17/6—19/6
597,972	Mar. 9	4½	4½	Do. 4½ p.c. Cum. Pref. ...	16/6—18/6
2,528,714	Aug. 24	1/-	7½	South East'n Gas Cn. Ld. Ord.	15/—17/-
1,000,000	,,	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	16/—18.-
1,068,869	,,	4	4	Do 4 p.c. Irred. Cum. Pref.	13/6—15/6
6,709,895	Aug. 5 '40	4	4	South Met. Ord.	57—62
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	80—85
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	62—67
1,895,445	June 29	3	3	Do. 3 p.c. Perp. Deb. ...	76—81
1,000,000	July 13	5	5	Do. 5 p.c. Red. Deb. ...	100—105
1,543,795	Aug. 4	4	4	South Suburban Ord. 5 p.c ...	78—83
512,825	,,	5	5	Do. 5 p.c. Perp. Pref. ...	97—102
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	76—81
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	87—92*
888,587	June 15	3	5	Do. 5 p.c. Perp. Deb. ...	108—113
750,541	Aug. 17	2	6	Southampton Ord.	72—77
350,000	,,	5½	5½	Swansea 5½ p.c. Red. Pref. ...	95—100
1,076,495	,,	5	5	Tottenham & District Ord. ...	86—91
338,555	,,	5	5	Do. 5 p.c. Pref.	95—100
453,380	June 8	4	4	Do. 4 p.c. Perp. Deb. ...	90—95
1,247,505	,, 29	4	†4	U. Kingdom Gas Cor. Ord. ...	15/6—17/6
1,085,952	May 18	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	17/—19/-
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	15, 6—17/6
745,263	June ,, 22	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	14/—16/-*
1,200,000	Mar. 16	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95
390,606	Aug. 24	6⅝	6⅝	Uxbridge, &c., 5 p.c.	102—107
1,371,138	,, 10	4	4	Wandsworth Consolidated ...	80—85
2,825,768	,,	4	4	Do. 4 p.c. Pref.	78—83
1,343,964	June ,, 15	5	5	Do. 5 p.c. Deb.	108—113
383,745	,,	4	4	Do. 4 p.c. Deb.	90—95
588,342	Aug. ,, 10	5	5	Watford & St. Albans Ord. ...	98—103
300,000	June 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89

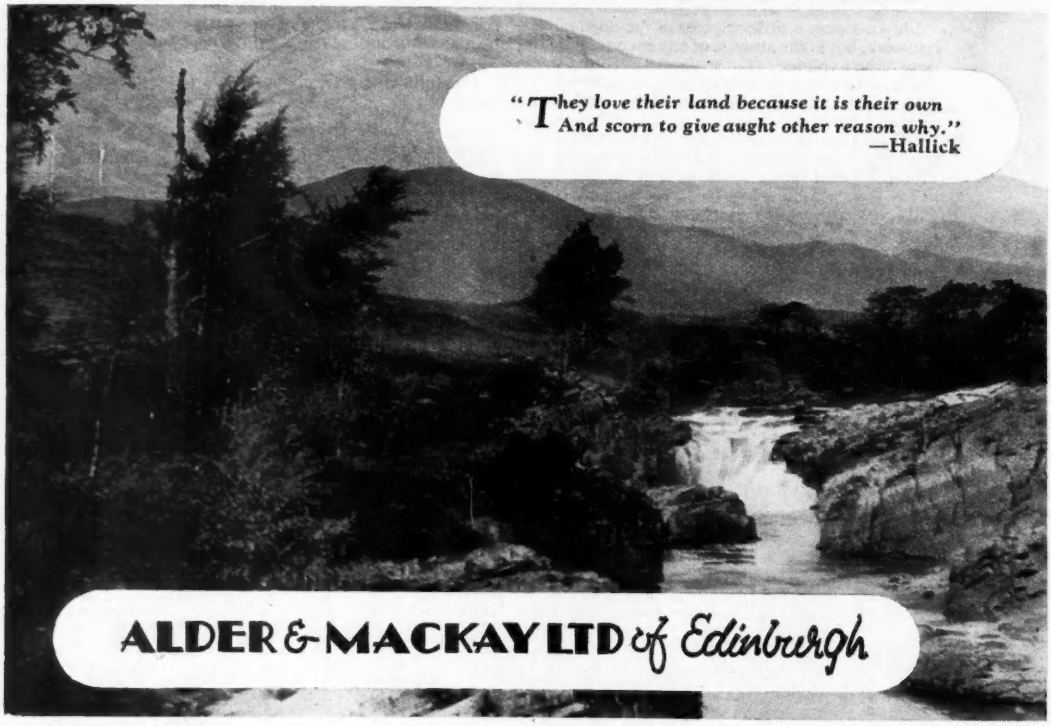
SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 4.
351,685	June 15	5	5	Brighton, &c., 5 p.c. Perp. Deb.	107—112
415,250	,,	4	4	Bristol Gas Co., 4 p.c. New Deb.	98—103
140,205	Aug. 4	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	125—135*
295,932	Aug. 17	5	5	Cheltenham, 5 p.c. Cons. Ord....	95—100
42,500	June 15	4	4	Do. 4 p.c. Perp. Deb....	90—95
150,000	Aug. 24	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	78—83
130,000	June 29	4	4	Do. 4 p.c. Deb. ...	95—100
146,700	Aug. 17	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	95—100
53,220	,, 9	6	6	Do. 6 p.c. Cum. Pref. ...	115—120
...	Aug. 19 '40	6	4	Eastbourne, 'B' 3½ p.c.... ...	37—42
239,135	July 13	5	5	Gas Consolidation 'A' Ord. (£1)	12/6—14/6
156,600	Aug. 17	5	5	Hampton C't, 5 p.c. Cons. Ord.	95 –100
18,000	Dec. 29	3½	3½	Malta & Med'n., 7 p.c. 1st Pref.	45—55
10,845	June 30'41	3½	3½	Do. 7½ p.c. 2nd Pref.	35—45
50,000	Aug. 24	£5 4 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	70—80
65,000	,,	5	5	North Middlesex, 5 p.c. Pref. ...	90—95
70,000	Mar. 9	5	5	Plymouth & Stone., 5 p.c. Deb.	103—108
76,501	June 29	4	4	Reading, 4 p.c. Perp. Deb. ...	92—95
74,777	Mar. 31	4	4	Romford, 4 p.c. Debs. (Reg.) ...	90—97
21,000	June 15	5	5	Slough, 5 p.c. Perp. Deb. ...	100—105
211,740	,,	5	5	Southampton, 5 p.c. Red. Deb.	95—100
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	99—102
202,019	Aug. 24	7⅜	7⅜	Tunbridge Wells, 4 p.c. Scale ...	119—124
135,257	June 15	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	107—112

PROVINCIAL EXCHANGES

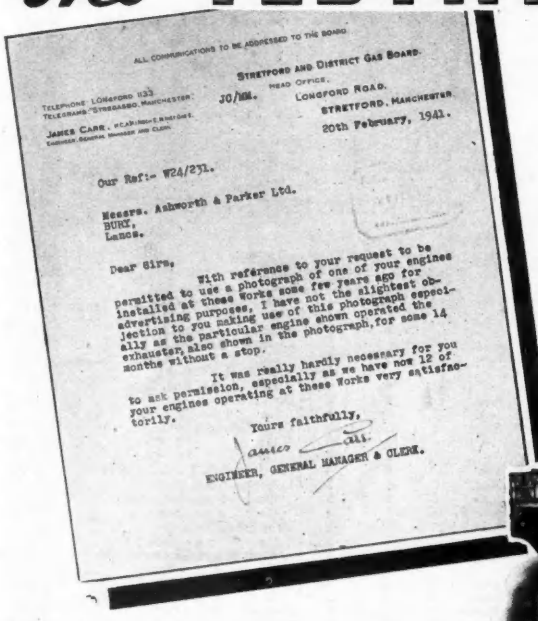
					Quotations Aug. 28.
804,948	Mar. 2	5	5	Bath Cons.	98—101
122,577	Aug. 17	6	5	Blyth 5 p.c. Ord.	100—105
1,667,250	July 13	5	5	Bristol, 5 p.c. max.	108—110
120,420	June 15	4	4	Do. 1st 4 p.c. Deb.	101—103
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	99—101
328,790	,,	5	5	Do. 5 p.c. Deb.	113—118
157,150	Aug. 4	6½	5	Chester 5 p.c. Ord.	96—99
92,500	June 15	4	4	Do. 4 p.c. Pref.	79—81
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	78—82
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—100
542,270	Aug. 17	9	6	Derby Cons.	115—120
55,000	June 15	4	4	Do. 4 p.c. Deb.	95—100
10,000	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	155—165
6,500	,,	10	10	Do. 'B' Ord. ...	155—165
79,000	,,	10	10	Do. 'C' Ord. ...	145—155
732,000	Feb. 23	4	4	Hartlepool G. & W. Cn. & New	71—73
2,167,410	Aug. 10	6	5	Liverpool 5 p.c. Ord.	100—102
245,500	June 15	5	5	Do. 5 p.c. Red. Pref. ...	100—102
306,083	July 15	4	4	Do. 4 p.c. Deb.	98—100
20,000	June 22	5	5	Long Eaton 5 p.c. Pref. ...	9—11
80,000	,,	5	5	Do. 5 p.c. Deb.	95—100
2,430,267	Aug. 4	5½	5	Newcastle and Gateshead Con.	19/6—20/6a
682,856	,,	4	4	Do. 4 p.c. Pref.	92½—93½
776,706	Dec. 29	3½	3½	Do. 3½ p.c. Deb.	86½—87½
277,285	Nov. 3	5	5	Do. 5 p.c. Deb. '42 ...	99—101
274,000	March 17	5	5	Newport (Mon.) Ord.	86—89
13,200	Sept. 16	8½	7	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½
13,600	,,	6	5	Do. 7 p.c. 'B'	9½—10½
40,000	,,	5	6	Do. 7 p.c. 'C'	9½—10½
106,280	Aug. 10	10	10	Preston 'A' 10 p.c.	150—160
188,219	,,	7	7	Do. 'B' 7 p.c.	109—110
1,806,339	Aug. 24	6½	6½	Sheffield Cons.	126—128
95,000	July 6	4	4	Do. 4 p.c. Deb.	98—100
332,351	Feb. 16	6	6	Sunderland 6 p.c. max. ...	111½—112½
192,150	Aug. 10	5	5	Weston-super-Mare Cons. ...	93—97
64,338	June 29	4	4	Do. 4 p.c. Deb.	84—89
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	138—143

a —The quotation is per £1 of Stock. * Ex. div † Paid free of income-tax. †For year.


"They love their land because it is their own
And scorn to give aught other reason why."
—Hallick
ALDER & MACKAY LTD of Edinburgh

In the Highlands, Scotland.

The TESTIMONIAL . . . . .



ALL COMMUNICATIONS TO BE ADDRESSED TO THE BOARD.

STRETFORD AND DISTRICT GAS BOARD.

TELEPHONE: LONGFORD 133. TELEGRAMS: "GYRGASBO, MANCHESTER." JAMES CARR, M.C.A.(HON.), A.M.I.GAS E. CONSULTING, GENERAL MANAGER AND CLERK.

HEAD OFFICE, LONGFORD ROAD, STRETFORD, MANCHESTER.

JC/MK. 20th February, 1941.

Our Ref:- W24/231.

Messrs. Ashworth & Parker Ltd.
BURY,
Lancs.

Dear Sirs,

With reference to your request to be permitted to use a photograph of one of your engines installed at these Works some few years ago for advertising purposes, I have not the slightest objection to you making use of this photograph especially as the particular engine shown operated the exhauster also shown in the photograph, for some 14 months without a stop.

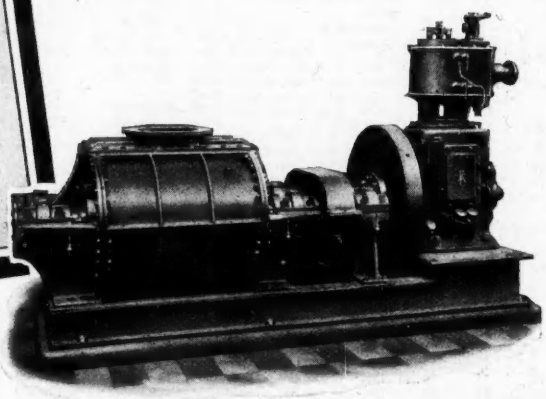
It was really hardly necessary for you to ask permission, especially as we have now 12 of your engines operating at these Works very satisfactorily.

Yours faithfully,

ENGINEER, GENERAL MANAGER & CLERK.

and one of the

PARKER ENGINES



The installation referred to in the above letter is shown opposite, and comprises a 55 B.H.P. Parker Engine driving a Holmes-Connersville Exhauster.

Repeat orders are the best proof of reliability and performance.

ASHWORTH & PARKER LTD.
RIVERSIDE WORKS · BURY · LANCS.
Telephone: Bury 620/1. *Telegrams: "Kinetic, Bury."*

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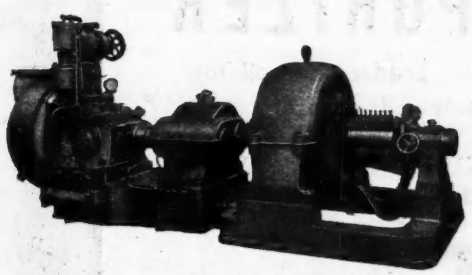
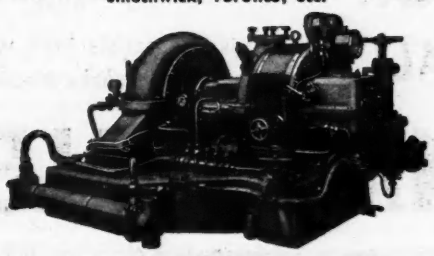
STEAM TURBINES FOR GASWORKS

Our Turbines, made for all powers up to 15,000 B.H.P. and for all conditions of service, are installed for driving Exhausters, Boosters, and Generators in many Gas Works, including:—

The Gas Light & Coke Co., South Suburban Gas Co., Wandsworth & District Gas Co., and in Works of Corporations and Companies at—Birmingham, Bristol, Coventry, Cardiff, Exeter, Liverpool, Manchester, Newcastle-on-Tyne, Preston, Portsmouth, Sheffield, Smethwick, Toronto, etc.



300 kW Back Pressure Geared Turbo-Generator.



Exhauster driven by 150 B.H.P. Steam Turbine at 13,000 r.p.m.

Brotherhood plant for Gas Works also includes Reciprocating Boosters, Water Cooling Towers, Air and Gas Compressors for all pressures and capacities.

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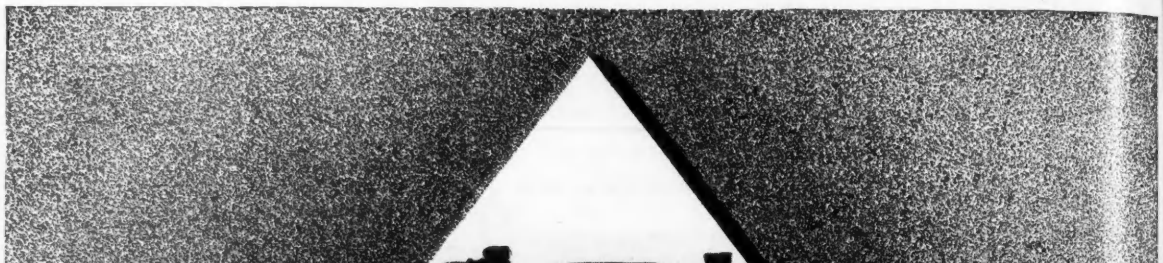
PETERBOROUGH :: Branch Offices in LONDON, LEEDS, MANCHESTER and GLASGOW



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Parkinson's petroleum vaporizers produce an oil fog that carries through mains services and meters.

This is the satisfactory way to prevent naphthalene deposits and internal corrosion, and to preserve all meters.

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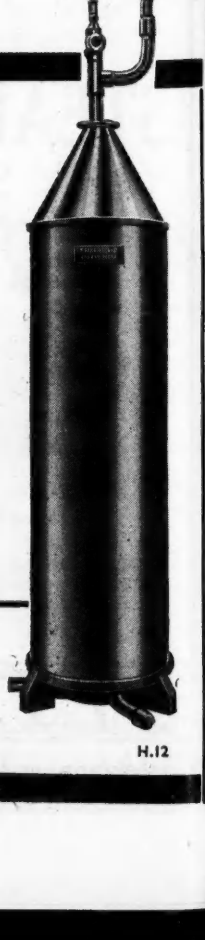

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